Creating a Strategy for Progress: A Contextual Behavioral Science Approach

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Behavior analysis is a field dedicated to the development and application of behavioral principles to the understanding and modification of the psychological actions of organisms. As such, behavior analysis was committed from the beginning to a comprehensive account of behavior, stretching from animal learning to complex human behavior. Despite that lofty goal, basic behavior analysis is having a generally harder time finding academic support, and applied behavior analysis has narrowed its focus. In the present paper we argue that both of these trends relate to the challenge of human language and cognition, and that developments within clinical behavior analysis and the analysis of derived relational responding are providing a way forward. To take full advantage of these developments, however, we argue that behavior analysts need to articulate their unique approach to theory, to develop more flexible language systems for applied workers, and to expand their methodological flexibility. This approach, which we term *contextual behavioral science*, is meant as an evolutionary step that will allow behavior analysis to better capture the center of modern psychological concerns in both the basic and applied areas. Clinical behavior analysis is showing a way forward for behavior analysis to regain its vision as a comprehensive approach to behavior.

Key words: contextual behavioral science, acceptance and commitment therapy, relational frame theory, behavior analysis, functional contextualism, radical behaviorism

When there are changes in the scientific practices of a field, it is periodically necessary to identify and describe a systematic position and the philosophical orientation and assumptions on which it stands (Leigland, 1997). We believe that both psychology and behavior analysis have entered into such a time. Although there are dangers in the current environment for behavior analysis, there is also a great opportunity if the original vision of behavior analysis can be recaptured.

THE PURPOSE AND STATE OF BEHAVIOR ANALYSIS

From the beginning, the ultimate goal of behavior analysis was to develop a comprehensive scientific approach that would account for the complexity of human behavior (Skinner, 1938/1966). The strategy for accomplishing that purpose was bold but improbable: to consider the behavior of a freely moving nonhuman organism observed under laboratory conditions in which orderly changes in behavior could be observed, recorded, and analyzed as a function of the manipulations of the experimental context (Leigland, 1997). The focus was on whole organisms acting in and with a context considered historically and situationally; careful inductive work on animal learning was designed to provide the analytic tools that would allow a science of that subject matter to "move on, but only as its growing power permits, to the complexities of the world at large" (Skinner, 1938/1966, p. xiv). Sets of carefully gathered observations were abstracted into principles that might provide an adequate foundation. Complexity was recognized as a problem that might be solved by developing, from the bottom up, "instruments and

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methods (…) of commensurate complexity'' (Skinner, 1971, p. 4). The ultimate concern was not the rat or pigeon: It was a comprehensive account. As if to ask the field to keep their eyes on that prize, Skinner took the extraordinary step of writing a utopian novel (Skinner, 1948) that was a ''call to psychologists to commit themselves to social responsibility'' (Richelle, 2000, p. 313), raising complex issues such as democracy, unemployment, education, and social equality. This larger purpose is foundational not just to behavior analysis but to many other scientific disciplines. Society relies on sciences (e.g., biology and physics) not only to find immediate solutions to their problems but also to enhance human culture and the human condition itself.

By most expected measures, behavior analysis has been a scientific and professional success, but when it is measured against its original lofty goals the picture is less clear. Basic behavior analysis is significantly less influential in basic behavioral science today than it was when the Association for Behavior Analysis (ABA) was formed 35 years ago. Applied behavior analysis is in many ways more influential, but its scope and vision have narrowed. Both of these claims need to be documented before turning to an analysis of why this has happened and what we need to do about it.

Weakening of Influence of Basic Behavior Analysis

There is clear evidence that mainstream basic behavior-analytic research is not considered central to experimental psychology. The *Journal of the Experimental Analysis of Behavior* (*JEAB*) is currently (mid-2008) ranked by the Institute for Scientific Information as 50th of 72 experimental psychology journals in terms of the citation impact of its articles. Of the 30 journals it is closely related to by citation pattern, *JEAB*

is ranked 24th by its citation impact. Despite the growth in psychology, current subscriptions are only 47% of the level achieved 30 years ago (Laties, 2008).

Basic behavior analysis is still strongly committed to animal learning, as is shown by the proportion of articles in *JEAB* with nonhuman subjects (on average about 75% of the articles in the past 4 years). Basic animal learning has fallen out of favor in the academic and funded research world, and basic behavior analysis is graying. Doctoral-level basic behavior analysis students often cannot readily get academic employment that permits the production of additional doctoral-level basic behavior analysts. In a recent article, Fantino (2008) noted the problem. He praised the progress and relevance of basic behavior analysis, but said,

I have the strong impression that behavior analysis is not doing quite as well in academia. In part this reflects budgetary and programmatic constraints that have caused retrenchment of animal behavior courses (particularly lab courses) and animal research laboratories. To some degree this reflects a shift of emphasis from animal learning (including behavior analysis) to neuroscience. But key behavioral vacancies at several major universities have been filled with candidates from other disciplines. (p. 126)

In a footnote, he added that he felt compelled to retain his position rather than retire in order to keep his operant psychology lab going and the faculty line in basic behavior analysis (p. 126). He is probably not alone. In 2005 we contacted the top 50 most published *JEAB* researchers in the preceding decade and over the preceding 30 years (counting both lists, 69 living researchers) and asked for a list of their doctoral graduates and the year of graduation (Hayes, Cardinal, & Waltz, 2005). All but three responded, listing 455 doctoral graduates. Before 1970, 38% were successfully placed in doctoral-level academic settings, but (not counting laboratories in the area of derived

stimulus relations) in the last decade fewer than 10 doctoral graduates per year were produced, and on average only one of these secured an academic job in a setting capable of producing additional doctoral-level graduates.

Narrowing of Applied Behavior Analysis

It is beyond question that direct behavioral principles have been very useful in many areas of human concern: education (e.g., Johnson & Layng, 1992; Layng, Twyman, & Stikeleather, 2004), organizational management (e.g., Glenn & Malott, 2004; Malott, Shimamune, & Malott, 1992), autism and special education (e.g., Charlop-Christy, Carpenter, Le, LeBlanc, & Kellet, 2002; LeBlanc et al., 2003), clinical settings (e.g., Dougher, 2000; Hayes, Strosahl, & Wilson, 1999; Kohlenberg & Tsai, 1991; Linehan, 1987), prevention and cultural practices (e.g., Biglan, Brennan, Foster, & Holder, 2004; Biglan, Sprague, & Moore, 2006), and stigma, violence, and social issues (e.g., Erickson, Mattaini, & McGuire, 2004; Mattaini & Thyer, 1996; Rusch, Kanter, & Brondino, in press). But it also seems that the amount of interest dedicated to some of those areas outweighs interest in others (Kangas & Vaidya, 2007).

ABA has been a spectacularly successful organization, but most of its modern growth can be laid at the feet of the professionalization of applied behavior analysis, particularly due to the role of applied behavior analysis in developmental disabilities (Kangas & Vaidya, 2007). This combination of success and narrowing of scope in applied behavior analysis is evident in many areas. New authors in the *Journal of Applied Behavior Analysis* are down (Dunlap, Clarke, & Reyes, 1998; Dymond, Clarke, Dunlap, & Steiner, 2000), and articles on developmental disabilities are a larger percentage of its articles (Northup, Vollmer, & Serrett, 1993).

Why?

If behavior analysis is not rapidly evolving toward its original grand vision (Richelle, 2000; Skinner, 1948), we need to ask why. For some time now we have been arguing that part of the problem is a lack of progress in the experimental analysis of human language and cognition (Hayes & Hayes, 1992b; Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Traditional behavioral accounts of these phenomena have received more conceptual and theoretical attention than applied or experimental attention (Dymond, O'Hora, Whelan, & O'Donovan, 2006). The experimental research on traditional behavioral accounts that does exist targets primarily developmental disabilities and not more complex phenomena (Dixon, Small, & Rosales, 2007). Our concern is shared by both applied and basic behavior analysts, who have appealed for more breadth in the consideration of complex topics (e.g., Fantino, 2008; Wiegand & Geller, 2004) and more methodological flexibility in addressing them (Wixted, 2008).

In the area of complex human behavior, interpretation has become a ballast in the behavior-analytic tradition. Skinner (1974) argued that scientific theories should use interpretation as part of their internal process of elaboration and development, but he emphasized that its purpose was ultimately pragmatic and empirical:

Every scientific field has a boundary beyond which discussion, though necessary, cannot be as precise as one would wish. One writer has recently said that "mere speculation which cannot be put to the test of experimental verification does not form part of science," but if that were true, a great deal of astronomy, for example, or atomic physics would not be science. Speculation is necessary, in fact, *to devise methods which will bring a subject matter under better control* [italics added]. (p. 21)

Over time, the role of interpretation has broadened within behavior analysis (Leslie, 2000), even to the point

of arguing against the need for experimental analysis on the grounds that ''any attempt to directly analyze complex phenomena experimentally would eliminate the very defining property of complexity'' (Burgos & Donahoe, 2000, p. 40). This is a fundamentally different view than one in which interpretation is a temporary, pragmatic, and empirical way station, held accountable to the goal of an experimental analysis that orients listeners to variables that are practically manipulable.

The survival of science depends not only on the utility and coherence of its propositions (e.g., Kantor, 1963, p. 155) but also on how a community of scientists learns to perpetuate itself within the structure of the larger community that it serves. It is important to examine actual evidence of broader cultural impact and support, and to adjust practices accordingly, rather than merely to bemoan the lack of impact and support when they fail to occur. With that process, behavior analysis can take responsibility for the dissemination, maintenance, and growth of our community within our society.

The topic of the current paper is how to develop behavior analysis in a way that yields a practically useful experimental analysis of complex human behavior and ensures the continuity of our tradition, while maintaining contact with its original strategic vision. In our view, clinical behavior analysis is not just building on basic behavior-analytic foundations; it is also actively changing those foundations and perspectives on how the field itself should best be developed. Our strategy will be to consider the development path being followed by acceptance and commitment therapy (ACT, said as one word, not initials; Hayes et al., 1999) and its associated basic behavior-analytic research program on the nature of language and cognition, relational frame theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001). We will examine how attempting to mount an approach in clinical behavior analysis with significant impact has over time systematically altered the behavior-analytic development strategy with which we began. We will describe how this development program, which has been termed a contextual behavioral science approach (Hayes, Levin, Plumb, Boulanger, & Pistorello, in press; Levin & Hayes, in press), differs from a more traditional behavior-analytic strategy and will consider whether it might serve as a guide for the evolution of behavior analysis more generally.

CONTEXTUAL BEHAVIORAL SCIENCE

Contextual behavioral science (CBS) is an elaboration of a behavior-analytic approach to scientific development rather than a particular line of research or group of novel methodological and analytical tools. In line with all of behavior analysis, CBS is

a principle-focused, inductive strategy of psychological system building, which emphasizes developing interventions based on theoretical models tightly linked to basic principles that are themselves constantly upgraded and evaluated. It involves the integration and simultaneous development of multiple levels of a research program including philosophical assumptions, basic science, basic and applied theory, intervention development, and treatment testing. (Hayes et al., in press)

What is different about a CBS approach is the systematic integration of these levels into a strategic whole and its relation to a communitarian effort designed to meet the needs of specific key constituencies within the overall group. These differences have led over time to philosophical refinement, the willingness to create parallel language conventions for different analytic purposes, greater methodological flexibility, a refined perspective about the role of theory, and a pragmatic approach to treatment testing. All of these differ-

ences can be traced, to a degree, to a common core. What would behavior analysis look like if its entire development strategy began with practical concerns about cultural and applied impact, but the goal was still an inductively developed comprehensive scientific approach that would account for the complexity of human behavior? Our answer is the CBS approach.

We will first describe the overarching philosophical assumption of the CBS view and its implications. After that, we will briefly consider the strategy followed by contextual behavioral science and a series of research fronts for the approach. We will conclude by summarizing the concrete development effort so far inside ACT and RFT.

The Converging Effect of Philosophical Assumptions

The why and for what of philosophy. Philosophy of science is the process of owning and explicating analytic assumptions. Many scientists have argued that empirical research is based on an interaction of philosophy of science and methodology that allows scientists to clarify the limitations and logical underpinnings of observations and data (Kazdin, 2003, p. 12).

Behavior-analytic researchers have always taken this idea seriously. Skinner was a master in juxtaposing methodological and empirical issues with philosophical matters. Skinner (1974) viewed behaviorism as the philosophy of a science of behavior, and the first book he attempted to write was on behavioral epistemology (see Skinner, 1976). In his hands, philosophy was not just a way to make his arguments more sound but also a way to create a science that made a difference. Philosophy was projected onto all aspects of the scientific enterprise: its scope, purpose, and methods.

This is in notable contrast to the role of philosophical thinking in the view of mainstream behavioral science, where it is often limited, discounted, and even ignored. Many behavioral scientists seem to believe that philosophy is a distraction: We should just let the data "speak." But science itself has shown that it is not possible to engage in systematic intellectual work without assumptions that go beyond the formal system being developed (Gödel, 1967). Thus, careful attention to the consistency and coherence of assumptions is necessary.

Functional contextualism. The philosophical stance that underlies a CBS approach is functional contextualism (Hayes, Hayes, Reese, & Sarbin, 1993; Hayes, 1993). *Functional contextualism* can be viewed as a particular construal of the essence of radical behaviorism; indeed, that purpose is obvious in its first explication, which was published in *JEAB* under the title "Finding the Philosophical Core" (Hayes, Hayes, & Reese, 1988). In clarifying that core, however, functional contextualism also subtly refines some aspects of the position. It also takes stances that are distinct from some other approaches to radical behaviorism because radical behaviorism as a philosophical system can be interpreted in a number of ways. The reason for this diversity is that Skinner was not always clear and at times used basic terms in different ways (Gifford & Hayes, 1999; Hayes et al., 1988; Parrott, 1983). There is no current universal agreement about radical behaviorism within the behavior-analytic community.

The contextualistic perspective on radical behaviorism links it to the pragmatic tradition (James, Dewey, Pierce), which sought a monistic and functional approach to knowledge and truth. Pragmatism leads to a worldview that emphasizes psychological epistemology over ontological claims. In the eyes of functional contextualists, behavior analysis shares those same assumptions:

The world is a real entity, but its differentiation is based on the actions of individuals impinging on it; typically, those are determined by their consequences, both within the lifetime of an individual and across lifetimes. Differentiation and analysis of the world are thus best justified not by superfluous ontological claims but by the utility of those actions. Knowledge "is a corpus of rules for effective action, and there is a special sense in which it could be 'true' if it yields the most effective action possible. (…) A proposition is 'true' to the extent that with its help the listener responds effectively to the situation it describes" (Skinner, 1974, p. 235).

In this area, functional contextualism offers a small but key refinement of radical behavioral thinking. If truth is not a state of the world but the achievement of the purposes of a given analysis, then it is necessary for scientists to state what those goals are (Hayes, 1993). Otherwise, *any* reinforced behavior is "true," which provides no guide to intellectual development. Scientific goals must be stated a priori in order to serve as a guide to pragmatic truth. Furthermore, intellectually speaking, ultimate analytic goals cannot be evaluated, because further evaluative criteria would be needed to evaluate them, ad infinitum.

The preanalytic goals of functional contextualism are a refinement of those in radical behaviorism: the prediction and influence of psychological events (i.e., the behavior of whole organisms interacting in and with a context defined historically and situationally) with precision, scope, and depth. The word *influence* is meant as a synonym for *control* but without the expansive meaning of the latter term in behavior analysis (e.g., sometimes *control* means the lack of variability) and without its unnecessarily worrisome political connotations. *Precision*, *scope*, and *depth* refer to the broader need for analyses to cohere across levels of analysis

(depth: e.g., psychology should not contradict biology), to find principles that apply to a range of phenomena (scope), and to be specific in how they apply to a given phenomenon (precision), all of which are arguably implicit or explicit in a radical behavioral approach (Biglan & Hayes, 1996).

These analytic goals best distinguish functional contextualism from other varieties of contextualism, such as interbehaviorism or social constructionism (Hayes et al., 1993). Although the goals of functional contextualism are taken to be isomorphic with radical behaviorism, there is an additional small difference. From the point of view of functional contextualism, it is unnecessarily dogmatic to claim, as Skinner did, that the purposes of science *are* prediction and control. It is more behaviorally sensible simply to take personal responsibility for goals ("*our* goals are prediction and influence"), rather than to argue that some abstract entity ("science") *has* them. The goals of functional contextualism are not argued to be true or universal; they are simply declared or owned.

Why functional contextualism? The term *functional contextualism* has been controversial in behavior analysis during its 20-year existence (Marr, 1993; Ruiz & Roche, 2007). Some have rejected it in a defense of the mechanistic nature of behavior analysis (Marr), and others have detected dangers in the undefended quality of the declared goals of analysis in a contextualistic approach (Ruiz & Roche).

What is important about functional contextualism for a behavior-analytic approach is that it justifies and makes coherent a number of otherwise odd aspects of the tradition. For example, while recognizing that behavior affects the environment and vice versa, the goals of prediction and influence explain the environmentalism of behavior analysis (Hayes &

Brownstein, 1986). Skinner (1974) acknowledged that "It is true that we could trace human behavior not only to the physical conditions which shape and maintain it but also to the causes of those conditions and the causes of those causes, almost ad infinitum," but we need take analysis only to the point at which "effective action can be taken" (p. 210). That point is always the environment because a putative cause of behavior "is useless in the control of behavior unless we can manipulate it" (Skinner, 1957, p. 34). In a similar way, the goals of behavior analysis also explain why private events are not viewed as causal, why ontological claims about scientific laws are rejected, and why developmentalism is eschewed (Hayes, Brownstein, Zettle, & Rosenfarb, 1986).

In addition, the term *functional contextualism* explicitly connects behavior analysis as a tradition to its historical pragmatic roots while avoiding many of the seemingly endless misunderstandings about radical behaviorism. What was radical about radical behaviorism was the reflection of behavioral thinking onto the actions of scientists, which then overturned several key aspects of traditional behaviorism (Skinner, 1945). Unfortunately, there seems to be no way to avoid the term *radical behaviorism* to be taken to mean "an extreme form of traditional behaviorism," which is almost the opposite of its actual historical meaning. *Functional contextualism* thus was also thought to be useful simply because it provides an opportunity for behavior analysts to be heard. Once that occurs, the term *radical behaviorism* is no longer a barrier. Thus, functional contextualists are not trying to eliminate the existing term but to be clear what it means and to find ways of speaking that produce greater openness to a behavior-analytic position.

Beyond merely the resistance to any new term, it might be argued that *functional contextualism* is divisive because construing behavior-analytic thought as a wing of pragmatism in a sense disenfranchises those who view behavior analysis in more mechanistic terms. That problem is equally true of the term *radical behaviorism*, however, if it is interpreted in fundamentally different ways. The struggle between mechanistic and contextualistic perspectives on behavior analysis does not disappear when the terms that describe that difference are avoided.

More recently Ruiz and Roche (2007) have argued against our contextualistic view on the grounds that scientific work must be guided by the overall values of a community and not by the personal values of the researcher. We agree that it is desirable in a scientific community to seek consensus about values (Leigland, 2003; Ruiz & Roche), but functional contextualism solves this problem in a way other than dictating values to others: by publicly stating scientific goals a priori so that others may decide whether their interests align with the form of pragmatic science being pursued (Hayes, 1993). That is what has been done within the CBS approach. For example, considerable attention was given to an attempt to reach a consensus about the values and goals of the Association for Contextual Behavior Science (ACBS) and ACT trainers. The resulting consensus values statements are featured prominently on the ACBS Web site (www.contextualpsychology.org).

A more subtle possible problem was pointed to by Sidman (1960) when he argued that "if science is to use the importance of data as a criterion for accepting or rejecting an experiment, it must have a set of impartial rules within which the scientist can operate when he has to make his evaluation. Do such rules actually exist? The answer is no" (p. 41). Sidman pointed out that what is not of value at one point in time might be of value in a different

context: "A variable may turn out to be relevant in contexts never suspected by the experimenter, or it may turn out to be minor and of minimal systematic importance. Since the directions of future progress are always uncertain, the student should not try to make a final decision about the importance of any demonstrated variable" (p. 40). But a pragmatic truth criterion does not mean demanding immediate applied relevance or fabricating futures to justify currently irrelevant findings. Instead, what is meant is the accomplishment of stated goals: for CBS, the prediction and influence of psychological events with precision, scope, and depth. That *can* be assessed to a degree. Does a finding have implications for how we predict or alter behavioral events? Does it suggest refinements of existing principles, ways to combine existing principles to predict and influence events within a domain, or ways in which inconsistencies across levels of analysis might be resolved? Sometimes individual studies are ambiguous on these points, but over any reasonable span of time, research programs should not be. If they are, the program is simply not known to be progressive. That should be a concern.

The alternative is to ascribe intrinsic value to methodological soundness, aside from the use or utility of science, and to suspend evaluations of progress almost indefinitely. This approach can justify facts for facts' sake, and there is good reason to believe that Sidman's (1960) argument was sometimes distorted into such an approach in some corners. When that occurred it was to the detriment of behavior analysis. Facts alone do not make a science. Otherwise it would be like claiming that precision alone is important, without seeking scope and depth. Arguing this way flies in the face of the history of science itself, and it contradicts the purpose of the field of behavior analysis. In our view, some of the shrinkage of basic behavior analysis can be laid at the feet of exactly that corrosive idea.

Functional contextualism and its implications for the behavior of scientists. To be consistent, the value of pragmatic assumptions is to be found in the accomplishment of purposes. Said in another way, progress is fundamental—everything else is conditional. That applies to methods, analytic strategies, and the structure of the scientific community itself. Merely because something is logical does not mean it is useful. For example, falsificationism may be logical, but it does not have a real place in most of mature sciences such as physics and chemistry (Sokal & Bricmont, 1998). The same can be said for analytic methods. Methods are methods of something—they are not goals in themselves. This is a traditional behavior-analytic idea. Elaborate multifactorial multivariate designs are logical, but behavior analysts have pointed out that studies based on that approach may not be as useful as simpler designs (Baer, 1977a); measures can be reliable, but that does not mean they are useful (Baer, 1977b; Hayes, Nelson, & Jarrett, 1987). This pragmatic focus applies to behavior analysis as well. We are not the first to note that behavior analysis itself has sometimes become quite rule bound in its methodology and approach (e.g., Wixted, 2008). Methodological rigidity violates the pragmatism on which behavior analysis was established. As Skinner noted above, science is not a way of capturing an ultimate structure: It is a way to orient people to successful ways of interacting with the world. A variety of methodological approaches and analyses can contribute to that, provided they are always held accountable to the goals of the analysis.

The overall criterion to judge the value or relevance of such a philosophical stance is its impact relative to its own verbally stated goals. In

the same way that it would be nonsense to analyze the role of the behavior of hitting a ball without the ball, as a pragmatist it makes no sense to discuss the logic or internal consistency of philosophical assumptions without examining their role in the development of useful science. To that topic we now turn.

THE CBS STRATEGY

Contextual behavioral science is simply a term for a vision of behavior analysis when it is planted firmly in functional contextual assumptions. From a functional contextual perspective, science is a human enterprise that has as its purpose the development of increasingly organized statements of relations among events that allow an analytic goal to be accomplished based on verifiable experience. The analytic goal of behavior-analytic science as seen from this perspective is the development of a comprehensive account that allows complex behavior to be predicted and influenced with precision, scope, and depth. Thus, as we examine the additional features of a CBS approach, the key focus is whether they are true to that vision and are showing signs of success.

Develop the Basic Principles Needed to Address Human Complexity

In a behavior-analytic approach, observations of simple environment–behavior relations are made in controlled settings in which the impact of environmental manipulations on subsequent behavior can be clearly elucidated. Refined and precise descriptions of these functional environment–behavior relations are abstracted into principles that are broadly applicable (i.e., that achieve scope) and yet maintain a limited number of constructs in the analysis of a given event (i.e., that achieve precision). Principles provide a means to meet the analytic goals of predicting and influencing behavior by specifying manipulable

contextual variables relevant to that goal applied at the level of the individual in functional analyses of behavior.

Built into the words *basic* and *applied* is the idea that applied work involves bringing foundational principles developed elsewhere ''into contact with'' (the root meaning of *apply*) practical issues. Unfortunately there is nothing to guarantee that basic researchers are developing the principles needed by applied workers. This problem cannot be solved by ignoring it or by brute force validation of applied technology. Both seem bound to fail because the need for principles cannot be ignored given the goals of precision, scope, and depth, and techniques alone are too low in scope to provide intellectual guidance for future developments. Expecting basic researchers to attend to applied needs seems bound to fail, because it demands that basic researchers know how to distinguish good applied ideas from hare-brained ones.

The solution encapsulated in a CBS approach is a mutual interest approach (Hayes, 1998a): the idea that a productive relationship can be built between applied and basic areas based on the contributions made by researchers in each area to specific and shared theoretical issues. Expanding the role of scientist-practitioners (Hayes, Barlow, & Nelson-Gray, 1999), if applied workers need basic guidance and it is not yet available, some need to follow their interests across the subdisciplinary divide and create basic research that is interesting and worthwhile to basic behavior analysts themselves because of the issues involved, not because this interest has been assigned to them by others, however well meaning and sincere.

That was what was done in the ACT-RFT wing of behavior analysis. In an attempt to create a more clinically useful basic analysis of human language and cognition, our clinical laboratory began to study

rule governance (e.g., Hayes et al., 1986) both in applied and basic areas (Hayes, Kohlenberg, & Melancon, 1989). Unable to find an adequate basic account of what a rule was, this interest gradually led to basic research on the nature of verbal stimuli (Hayes, Kohlenberg, & Hayes, 1991; Hayes & Hayes, 1992a; Steele & Hayes, 1991). Basic research was not justified in the pages of the basic journals in which they appeared (e.g., *JEAB*) on the basis of clinical application, but on a greater understanding of language and cognition, an interest shared by both applied and basic constituencies. Very quickly, basic behavior analysts became involved in this basic research program (e.g., Barnes, 1994; Barnes & Keenan, 1993), not because of a yearning for relevance but because the approach was inherently interesting. Basic researchers also became interested in the applied extensions of what they were developing (e.g., Barnes-Holmes, Cochrane, Barnes-Holmes, Stewart, & McHugh, 2004), in essence applying the same mutual interest approach but in a different direction.

The shared truth criteria of basic and applied behavior analysis (prediction and influence with precision, scope, and depth) remove the barrier between the two camps. All that is needed is a common problem. Not every clinician needs to do basic research; not every basic researcher needs to do applied work. Just a small number of people crossing that divide for reasons of mutual interest may be enough to greatly expand the coherence of our behavioral science.

Organize These Principles into Analytic Abstractive Theories in Key Content Domains

The relation of behavior analysis to theory has always been uneasy. Although he recognized the applied and basic importance of terms with high scope, Skinner (1950) warned against certain kinds of theorizing.

He was right to do so, but the point became overextended. Stimulus-response learning theorists had an extremely influential and very unfortunate view of theory. For them, theory was not about what was directly observed—if a functional relation is "always the same … then we would have no need of theory"—rather, theoretical constructs are "guesses as to what variables other *than the ones under the control of the experimenter* [italics added] are determining the response (Spence, 1944, p. 71). This kind of theory (hypothetico-deductive theory) has no place in behavior analysis. But to reach our analytic goals we need concepts that are abstracted from direct observation and that point to manipulable variables.

CBS approaches theory as sets of functional analyses within a domain. This kind of theory is "analytic abstractive" (Hayes et al., 2007): "We have a *behavioral theory* when there are (a) systematic and generally applicable analyses of important classes of behavioral observations (b) stated in terms of coherently related sets of behavioral principles, that (c) allow these behavioral phenomena within that class to be predicted and influenced as a unified goal" (Hayes, 1998b, p. 68).

Relational frame theory is such a theory. RFT is based on the premise that arbitrarily applicable relational responding is an operant, and that operant constitutes the foundation of verbal behavior (Hayes et al., 2001). Relations among events such as "bigger than" or "smaller than" are initially learned in nonarbitrary sets, but when the relational response is abstracted and brought under the control of arbitrary contextual cues, arbitrarily applicable relational responding can occur with any stimulus based on context. With sufficient relational conditioning, mutually and combinatorially entailed relations can be derived (Hayes et al., 2001), which allows many relations to

be acquired without direct learning and may account for the rapid generativity of language. The specific stimulus functions of a given event can be transformed through these relations, suggesting a process by which language influences behavior. Relational responding is thought to develop through reinforced multiple exemplars, as with other operants. No new principle is required to explain their existence. Over time a number of functional sets of relational responses (relational frames) are abstracted, often initially with non-arbitrary stimuli.

The resulting research program is gradually meeting the expectations for a full experimental analysis. Studies have shown several forms of mutual and combinatorial entailment (e.g., Berens & Hayes, 2007; Dougher, Hamilton, Fink, & Harrington, 2007; Dymond & Barnes, 1995; Dymond, Roche, Forsyth, Whelan, & Rhoden, 2007; Kohlenberg, Hayes, & Hayes, 1991). Arbitrarily applied relational responding can transform a multitude of stimulus functions including discriminative (e.g., Dymond & Barnes), eliciting (e.g., Dougher et al.), reinforcement (e.g., Hayes, Kohlenberg, & Hayes, 1991), and avoidance functions (e.g., Dymond et al.). Indirect support for an operant conception of relational responding comes from evidence that relational responding develops over time (e.g., Lipkens, Hayes, & Hayes, 1993) and comes under the control of antecedents and consequences (e.g., Healy, Barnes-Holmes, & Smeets, 2000; Roche, Barnes-Holmes, Smeets, Barnes-Holmes, & McGeady, 2000). More direct support comes from evidence that relational operants can be trained through multiple exemplars (e.g., Y. Barnes-Holmes, Barnes-Holmes, Smeets, Strand, & Friman, 2004; Berens & Hayes). The strength of derived relational responding correlates with performance in cognitive tests (e.g., O'Hora, Pelaez, & Barnes-Holmes, 2005), and training to improve rela-

tional responding improves performance in some cognitive tests (e.g., McHugh, Barnes-Holmes, Barnes-Holmes, & Stewart, 2006). Increasingly RFT has been applied to more complex human behavior such as analogical reasoning (Lipkens et al., 1993; Stewart & Barnes-Holmes, 2004) and perspective taking (e.g., McHugh, Barnes-Holmes, & Barnes-Holmes, 2004a; Rehfeldt, Dillen, Ziomek, & Kowalchuk, 2007). Although RFT has been questioned and criticized (e.g., Horne & Lowe, 1997; Ingvarsson & Morris, 2004; Palmer, 2004; Tonneau, 2004), the program of experimental research that supports this account seems to be progressing.

Develop Approaches to Pathology, Intervention, and Health Based on Middle-Level Functional Terms

Scaling this approach to clinical concerns, however, requires another liberalization. As domains begin to contain broader, more complex, and more domain-specific features, domain-specific terms are needed that help to apply principles and analytic abstractive theories.

Behavioral principles do not provide specific guidance about the circumstances under which those principles can be applied. The principle of reinforcement does not tell us about the adequate reinforcers in an applied population, for example. That is part of the source of their scope, but it also can inhibit their broad use. When complex human behavior is targeted, terms are needed to help to apply behavioral principles to a domain, or to specify critical targets and means of intervention without requiring every practitioner to master the basic account.

We call these terms by the deliberately humble label of *middle-level functional terms*. These are scientific constructs that serve as shortcuts for applying basic principles and theories to complex situations. Middle-level functional terms are not hypothetical

entities but instead are higher level functional abstractions. They are different from the constructs proposed by hypothetico-deductive theories, because (a) they are based on sets of functional analyses based on behavioral principles based on behavioral observations and are held accountable to each link of the theoretical chain, and (b) they need to be shown to be useful in prediction and influence. Many behavior analysts have recognized the need to create a more user-friendly interface for non-behavior analysts to use behavior-analytic knowledge (Mattaini, 1993). Middle-level functional terms are designed to help to accomplish this goal.

Middle-level functional terms have four important roles to play. They are designed to orient the listener to key features of a domain, encourage the application of analytic abstractive theories and basic behavioral principles, ensure better outcomes, and facilitate knowledge development. These terms have long been used in behavior analysis, but their role has often been underappreciated. *Attention*, for example, is not a behavioral principle: It is a functional class of reinforcers that is useful in many applied areas because many forms of behavior can be attention maintained. *Aggression* is not a behavioral principle: It is a functional class of behaviors. *Attention* and *aggression* are middle-level functional terms.

The reason their current use is often missed is that behavior analysts often treat such terms ontologically, but a behavioral approach to language is based on the idea that "meaning is use." Thus, these terms cannot ultimately be justified because they "refer to real things," because there is no way to step outside our own behavioral stream to distinguish between what is merely useful and what is supposedly real. Rather, all behavioral terms should be justified because they are functional. Once that is seen, this same approach can

be greatly amplified if it is done systematically and carefully to create useful middle-level functional terms. The risk of middle-level functional terms is reification: the tendency to treat terms as if they refer to things or structures. That is a danger, but it is equally so with any term, and the danger is lessened, not increased, by being clear about what these terms are and what they are designed to do.

ACT as an operating system. One way to understand the need for middle-level functional terms is through the analogy of an operating system. Basic behavioral principles can be compared to the programming languages that allows a computer programmer to write a program that interacts successfully with machine code. Software programs (e.g., a browser) are written in such languages, just as specific analytic abstractive theories are based on behavioral principles. But in the same way that a computer user may need an operating system to make the browser work efficiently, applied workers need sets of middle-level functional terms to help them to apply theories and principles.

In the past, behavior analysts attempted to address this issue by making behavioral principles understandable to clinicians (Kanfer & Grimm, 1977; Kanfer & Saslow, 1973). This can be helpful, but it can be arduous and does not always seem necessary. In addition, the level of behavioral principles can be too complex for many practitioners to apply them in a replicable manner (Follette & Hayes, 1992), and even specific theories such as RFT can be too complex to use without help. Just as it may not be necessary to know the programming code behind a program in order to use the program, the level of abstraction of behavioral concepts needs to be fitted to their purpose.

We will describe ACT as an example of work within CBS to show how we are attempting to develop and use middle-level functional terms

to apply behavioral theories and principles. The analysis that underlies ACT can be thought of as such an operating system. We will describe it only briefly, because ACT is by now relatively well known and has been explicated several times (including accounts in this journal).

One can think of ACT as a model of psychopathology, health, and intervention in the form of a hexagon constructed of six components—defusion, acceptance, present moment, self as context, values, and committed action—all interconnected around the central process of psychological flexibility (Hayes et al., 2006). This model has been referred to as the ACT *turtle operating system* (Muto, 2008) both because of its hexagonal shape (like a turtle shell) and because it connotes the slow and steady movement of a bottom-up, inductive CBS approach rather than the impulsive, leaping hare-like quality of the hypothetico-deductive approach (Hayes et al., in press).

The elements in ACT's turtle operating system are not hypothetical entities or structures but are middle-level functional terms that orient the analysis toward behavioral processes that are likely to be seen in complex human behavior in which language functions dominate. The metaphor of an operating system implies the multiple linkages between middle-level terms and behavioral principles.

Defusion-fusion refers to the domination of verbal events in the regulation of behavior over other sources of control (Hayes et al., in press). Behavior analysts have long known that verbal rules can be repertoire narrowing, and can induce insensitivity to other contingencies (Hayes et al., 1989). One particularly troublesome form of fusion occurs when the individual attempts to change aversive thoughts or other private events by applying verbal rules that themselves perpetuate those events. Fusion is not inherently harmful in all contexts, but because it is so domi-

nant, ACT therapists spend a lot of time establishing defusion skills so that situations that call for it can be discriminated and the skills can be applied. Drawing from the RFT distinction between functional contexts (which control the transformation of stimulus functions) and relational contexts (which control relational derivation), defusion methods attempt to alter the functional context of verbal events maintained by a social verbal community, such as contexts of literality, sense making, and problem solving. A common example is the use of word repetition, which has been shown to reduce the functional impact of distressing thoughts by shortening them to a word and saying them aloud repeatedly for some period of time (Masuda et al., 2004). Another example was a recent study (McMullen et al., 2008) that found a strong defusion effect that influenced subsequent pain tolerance just by having participants read a statement aloud while walking around the room. The statement was, "I cannot walk around this room." Defusion is useful when detecting the rigid, insensitive, and repertoire-narrowing effects of verbal rules.

Acceptance involves the adoption of an intentionally open, receptive, and flexible posture with respect to moment-to-moment experience such as thoughts, feelings, bodily sensations, and memories. Experiential avoidance stands as the opposite of psychological acceptance. From a behavior-analytic perspective, private events do not play a causal role in overt behavior (Hayes & Brownstein, 1986), but the social verbal community establishes such chains through a variety of means. For example, evaluative and causal relations and the encouragement of problem solving are enough for anxiety to be related to "bad" or to the prediction of negative consequences (e.g., social humiliation, loss of control); thus, anxiety becomes a problem to be solved. There is an extensive litera-

ture that shows that the avoidance of uncomfortable private events has a repertoire-narrowing impact, and often leads to the exacerbation of the same private events that the individual was attempting to avoid or suppress (e.g., Baumeister, Zell, & Tice, 2007; John & Gross, 2004; Pennebaker & Chung, 2007; Wenzlaff & Wegner, 2000). Acceptance methods weaken the arbitrary linkage between emotions and actions and undermine the repertoire-narrowing effects of experiential avoidance as a form of aversive control.

Clinicians might also find it useful to think in terms of a lack of *contact with the present moment* when the client seems to lack sensitivity to the contingencies of the environment (without excluding as *environment* the client's own private events). Speaking and thinking in terms of contact with the present moment help practitioners to direct the individual (and themselves) towards contact with environmental contingencies and behavioral impact, which may increase the likelihood of generating new and more adequate responses to covert and overt events. This middle-level term is discussed in the larger literature as *mindfulness* but, as argued elsewhere, from a CBS standpoint, this construct should be analyzed scientifically (e.g., Hayes & Plumb, 2007).

Self as context is a middle-level term that orients clinicians towards a stable sense of self described as a "locus or context of self-knowledge [that] will not and cannot [change]" (Hayes, 1984, p. 104). This notion of self is in line with Skinner's (1974) definition of self-knowledge as the discrimination of the organism's own behavior, but adds to this conceptualization by arguing that humans not only discriminate their own behavior but they do so verbally (D. Barnes-Holmes, Hayes, & Dymond, 2001; Hayes, 1984; Hayes & Gregg, 2001; Hayes & Wilson, 1993) and from a consistent, verbally established per-

spective. Self as context is a highly complex psychological process that requires the integration of multiple behavioral repertoires (Hayes et al., 2001; Vilardaga, in press). A sense of perspective is related to deictic relational framing such as I–you, here–there, and now–then. There is a growing literature in RFT that supports the notion that this sense of self relates to other complex human phenomena such as empathy, theory of mind, and perspective taking (McHugh, Barnes-Holmes, & Barnes-Holmes, 2004b; e.g., Rehfeldt et al., 2007).

Values are chosen, verbally constructed consequences of dynamic, evolving patterns of activity, for which the predominant reinforcer becomes intrinsic to the behavioral pattern itself (Wilson & Dufrene, 2009). This middle-level construct keeps the clinician's eye on possible appetitive events in the life of a particular individual. Values techniques serve as augmentals (verbal establishing operations) for features of present behavior. The ACT work on values connects with the radical behavioral stance of encouraging control through positive reinforcement rather than through negative reinforcement, but adds the notion that values are verbally constructed patterns of behavior not necessarily linked to direct contingencies (at least not in a traditional behavioral sense). In that regard, values are crucial because they establish large patterns of behavior that are less likely to be disturbed by immediate reinforcers not linked to verbally constructed chosen consequences.

Committed action refers to the continuous redirection of behavior so as to construct larger and larger patterns of flexible and effective action in line with chosen values. ACT therapists encourage committed action in their clients because behavior change is the ultimate purpose of the model and the test of the processes addressed earlier. Committed

action is an indicator not only of the extent to which the individual has a repertoire to pursue those ends but also of his or her overall psychological flexibility. It is worth mentioning that when ACT therapists target committed action, they normally use traditional behavior-change techniques such as exposure or skill development.

The resulting outcome of these psychological processes is what has been called *psychological flexibility*. This term serves to define the target of interventions based on the ACT model and is arguably the conjoined result of those processes.

To understand the interconnections among ACT, RFT, behavior analysis, and CBS, it is worth thinking about a continuum of behavioral repertoires involved in applied work, depicted by the model shown in Figure 1. Some applied work is based on direct helping skills, and other applied skills are based on how problems and interventions are conceptualized. Within this latter set, some work is based on lay theories; some may be based on middle-level functional terms; and some may be based on precise behavioral principles (Figure 1, top). The middle panel illustrates the idea that most forms of nonempirical applied work are little more than a combination of direct helping skills and lay theories. In addition to direct helping behaviors, traditional cognitive behavior therapy (CBT) adds some functional terms and at times even a sliver of basic principles, whereas in applied behavior analysis that is reversed, with some middle-level functional concepts and a large dose of behavioral principles. The bottom panel illustrates the idea that a CBS approach spans the full range up to the use of lay terms in its science and practice, and the ACT-RFT approaches are just part of CBS. It also illustrates the idea that the turtle operating system way of viewing pathology, health, and intervention is deliberately locat-

ed at the most liberal edge of CBS, whereas more technical work in ACT (and even more so in RFT) is closer to traditional behavior analysis. RFT, not just ACT, belongs partly in the applied area because of direct applications in language learning and the like.

The CBS Fronts of Exploration: Tests Using Diverse Methods

How do we best go about exploring analytic abstractive theories and sets of middle-level functional terms and the techniques based on them? This is an area in which the characteristics of a CBS approach differ most dramatically from mainstream behavior analysis.

Because the psychological level of analysis is the whole organism interacting in and with a context defined historically and situationally, it is important to base psychological principles, theories, and functional terms on empirical analyses at the level of the individual (Skinner, 1961). It is often worthwhile initially to examine the impact of various applied techniques in the same way. But a CBS approach deviates from traditional behavior analysis, with the view that if the analysis applies at the level of the individual, the impact and processes often need to be shown also at the level of the group.

The need for this step is not just pragmatic. Obviously in the modern era randomized controlled trials are the gold standard in many applied areas. Apart from the funding and political issues involved, however, group designs are a necessary component of a CBS approach for three reasons. First, when sets of functional analyses are gathered into theories and middle-level functional terms, the functional analytic issues are often shared among individuals. RFT is an example that argues that relational operants form the basis of human language and cognition. If so, one needs to show that these process-
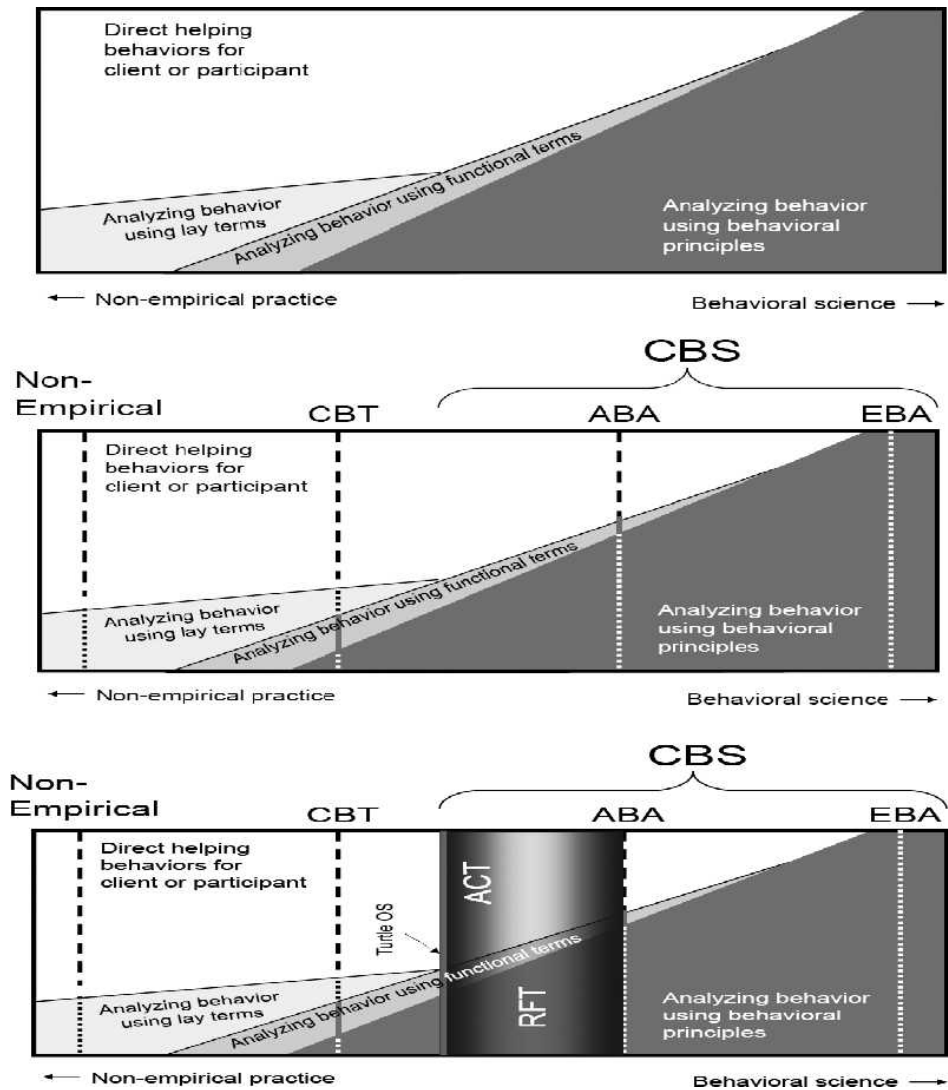
Figure 1.   Interconnections among CBT, ACT, RFT, behavior analysis, and CBS.

es apply at the level of verbal human beings; the shared properties of the set of functional analyses that led to such a generalization demand it. Second, when technologies are disseminated, their broad outcomes within targeted populations are a key matter that needs to be explored experimentally. Information about this key applied matter requires group designs. Finally, a key focus of theory needs to be on scope, and that is often helped by examination of the group.

The behavior-analytic community at large has warned against the dangers of just such scientific practice: "It might then be a short step from the analysis of the behavior of the individual in controlled settings to group designs and statistical inference, and from an interest in behavioral phenomena to an interest in inferential (…) theory" (Leigland, 1997, p. 24). We think that danger is overblown if (a) there is greater clarity about the nature of analytic abstractive theory, (b) principles and

theories are based on the individual and then scaled, and (c) statistical inference is properly used.

Many aspects of the initial development of statistical theory (Fisher, 1935; Neyman & Pearson, 1938) are indeed hostile to behavior-analytic sensibilities. In its beginnings, statistical inference had to rely on mathematical functions to make decisions about differences in the distribution of a population, because at that point in time any other types of calculations were lengthy and tedious (Todman & Dugard, 2001). In the modern era, new statistical approaches are available that allow the direct analysis of small groups of individuals or single individuals without having to assume a normal distribution. Some of these have grown close to the longitudinal approach of traditional behavior analysis (e.g., Hedeker & Gibbons, 2006).

The other problem with statistical inference was not mathematical but conceptual. Classical statistical theory argued that random sampling is the solution to external validity, but this requirement is almost never met (Edgington & Onghena, 2007), leaving the issue of generalization hanging. CBS takes another approach: Keep the focus on the precision, scope, and depth of principles, theories, and middle-level functional concepts. In other words, one must program and test for generalization, not assume it. Researchers test the generalization of functional environment–behavior relations specified in analytic abstractive theories of pathology and intervention in large part by scaling an intervention to a group with specific functional characteristics (Biglan & Hayes, 1996). Individuals are analyzed in groups formed on the basis of targeted functional processes rather than syndromes or topographical distinctions. This approach to group designs may be more adequate for generalization because the processes being targeted link back to basic principles and findings from

controlled laboratory settings with individuals. In other words, if we want to explore the generalization of a pattern of behavior through group design studies, we also need to produce basic laboratory research in interconnection with the development of analytic abstractive theories and middle-level terms. Linking middle-level terms back to basic principles is an ongoing process that can be explored both theoretically and empirically; it is a process subject to constant refinement and revision; ultimately, the results are the only judge to advocate for its use.

To explore the scope of principles and theories at the group level, it is critical to develop measures of middle-level functional constructs. A variety of such measures have been developed in the ACT-RFT research program, including self-report measures (e.g., Blackledge, Spencer, & Ciarrochi, 2007; Dahl & Lundgren, 2007; Hayes, Bissett, et al., 2004; Hayes, Strosahl, et al., 2004; McCracken, Vowles, & Eccleston, 2004; Wilson, Sandoz, Kitchens, & Roberts, 2008) as well as other assessment tools, such as implicit measures (e.g., D. Barnes-Holmes et al., 2006), discounting measures (Waltz & Follette, 2008), and coding in-session behaviors (e.g., Hesser, Westin, & Andersson, 2008).

These can be used nomothetically, but they can also be used in functional diagnosis or case formulation. A functional diagnosis is an abstract characterization of client problems and strengths in which the interconnection of symptoms and situational triggers is organized with the aim of guiding the therapist's intervention (Sturmey, Ward-Horner, Marroquin, & Doran, 2007). Traditional functional diagnosis has focused more on descriptive or direct analyses of current and observed behaviors than on the individual's historical context. Analytic abstractive theories and their adjunct middle-level terms help to fill in this gap. For example, a person with high levels of experiential

avoidance will often respond to interventions differently (e.g., Masuda et al., 2007), and knowing that literature allows better case formulation.

In the following paragraphs we will summarize what we have come to label as fronts of exploration. A front of exploration is a particular way in which the experimenter interacts with the phenomena of interest. None of those fronts has priority over any other in and of itself. Together these fronts inform each other. Variety of methods of exploration is key. We will begin with outcome studies and proceed to a number of other approaches.

Time series studies. This approach is at the core of the behavior-analytic tradition, and we have written about it extensively (e.g., Hayes, Barlow, & Nelson-Gray, 1999). ACT and RFT researchers have consistently carried out this type of study to establish and refine principles and theories. It is also useful in outcome analysis. For example, time series have shown that ACT produces positive effects with skin picking (Twohig, Hayes, & Masuda, 2006b), marijuana use (Twohig, Shoenberger, & Hayes, 2007), and obsessive compulsive disorder (Twohig, Hayes, & Masuda, 2006a).

Randomized controlled trials. Randomized controlled trials (RCTs) represent another front used in CBS. However, RCTs are used differently in CBS compared to the dominant stage-based model of research within clinical psychology. In the more dominant model of clinical intervention testing, RCTs are considered to be the gold standard due to their perceived ability to achieve internal validity and maintain external validity by examining the efficacy of a manualized treatment targeting a specified disorder. This approach assumes that treatments should be tested with regard to so-called psychological disorders, but syndromal classification is largely inconsistent with a functional analytic approach. Rather, in a CBS approach, RCTs

are used to empirically test the scope of the theoretical model across a variety of problem behaviors and contexts.

Meta-analyses (Hayes et al., 2006; Öst, 2008; Powers, Zum Vörde Sive Vörding, & Emmelkamp, in press) have supported the empirical utility of ACT. RCTs have demonstrated the beneficial effects of ACT in dealing with problems related to depression, anxiety, substance use, psychosis, borderline personality disorder, trichotillomania, epilepsy, weight maintenance, coping with cancer, and diabetes management (e.g., Bach & Hayes, 2002; Dalrymple & Herbert, 2007; Gratz & Gunderson, 2006; Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007; Hayes, Wilson, et al., 2004; Lillis, 2008; Lundgren, Dahl, & Hayes, 2008; Woods, Wetterneck, & Flessner, 2006; Zettle & Hayes, 1986). What integrates this wide variety of phenomenon is the underlying model. Formal testing of that model is done in another fashion.

Mediational and moderation analyses. Measures of middle-level terms can subsequently be explored in group outcome studies through mediational analysis. The statistical approach of this front of exploration provides a link between theory and outcomes in group design studies by examining the process variables that account for the relation between treatment and outcome (Kazdin, 2007; MacKinnon, Fairchild, & Fritz, 2007). These analyses can be used to see whether an intervention affects the processes it is designed to and whether the theoretical processes of change account for the observed impact of an intervention on outcome (Follette, 1995). Identifying the processes of change may be less important when using specified behavior-analytic principles (e.g., differential reinforcement and extinction), particularly when linked to an ideographic functional analysis. However, when such interventions have been scaled to a group level,

statistical analyses of processes of change for a treatment can be very beneficial to explore the functional variables through which treatment is believed to produce an outcome. Current psychosocial interventions often lack adequate mediation data (Murphy et al., 2009), and the tighter links among basic principles, theoretical models, and technologies in a CBS approach, is clear advantage. Examples of mediation analyses can be found in the ACT-RFT literature (Forman, Herbert, Moitra, Yeomans, & Geller, 2007; e.g., Lundgren et al., 2008).

Moderation analyses serve a similar purpose. By definition, they examine variables that influence the impact of treatment on outcome (Kazdin, 2007). This approach provides important information regarding how individual characteristics and contextual factors can influence the effects of an intervention. Thus, moderation analysis allows researchers to explore ideographic variables, suggesting particular interventions or processes of change to emphasize depending on the individual and context (e.g., Forman, Hoffman, et al., 2007; Masuda et al., 2007). This provides one opportunity for clinical behavior analysts to communicate to other fields the importance of ideographic factors that may influence an intervention, rather than "one size fits all" approaches, and a general method to test for these factors at a group level.

Cross-sectional analyses. Cross-sectional research is a front of exploration that examines the correlations between various behaviors and contextual factors that can inform theory as well as interventions (Biglan et al., 1996). The identification of behavior–behavior relations and contextual factors has typically been studied in behavior analysis through more ideographic approaches such as functional analysis. Yet, cross-sectional research at a group level represents the standard for identifying such variables within many other fields of psychology. In addition, this method can be useful, because it provides a quick gauge of the extension and relevance of middle-level constructs, it helps to identify contextual factors that relate to behaviors, and it may suggest new behavior–behavior relations (e.g., Bond & Bunce, 2003; Norberg, Wetterneck, Woods, & Conelea, 2007). Thus, such research can provide a general, albeit less precise, estimation of the applicability of functional analyses scaled to a group level for a given population.

Qualitative research. Qualitative research can contribute to the development of assessment and intervention programs that are sensitive to the cultural context, and to the multiple perspectives of stakeholders in research.

Treatment components analyses. Another group design method involves exploring specific treatment components of a treatment package. Treatment components represent functional sets of intervention technologies that target specified processes. CBS emphasizes evaluating the impact of these treatment components as well as specific technologies separate from the entire treatment package. Due to the nature of the middle-level functional constructs elaborated in CBS, these studies also test the adequacy of the theory in specifying processes of change that will produce clinically relevant outcomes. The most common approach to component testing in clinical psychology is dismantling studies in which critical components of a treatment package are removed and then compared to the full package in a randomized controlled trial. Although the cost and effort of large dismantling studies constitute important barriers to their implementation, smaller treatment-component analyses are a more feasible alternative and constitute an additional source of scientific inquiry (e.g., Williams, 2006).

Analogue and small-scale research. In a CBS approach, small-scale analogue studies are often used to test treatment technologies as well as to examine important theoretical questions in highly controlled settings in which the impact of experimental manipulations on outcomes can be more clearly elucidated. Such controlled studies allow a finer analysis of the role and impact of middle-level constructs on proximal outcomes. In these studies, behavioral measures, such as persisting in a distressing task, often act as proxies for clinically relevant behavior. The reduced burden of running these smaller scale studies allows researchers to test treatment components and specific technologies throughout treatment development, rather than solely relying on expensive and time-consuming randomized controlled trials. This serves to increase the efficiency in building and improving on the treatment and model as well as to provide a strong understanding of the impact of treatment components on hypothesized processes of change and treatment outcomes. Several small-scale analogue and component studies with clinically relevant behaviors have informed the ACT model (e.g., Masuda, Hayes, Sackett, & Twohig, 2004; McMullen et al., 2008; Páez-Blarrina et al., 2008).

Effectiveness trials. Effectiveness trials represent another important front used in CBS. Contrary to other common approaches within clinical psychology, CBS involves an early and continuous emphasis on effectiveness studies (Hayes, 2002). These studies test the application of a given treatment in a more real-world setting. This may involve treating a heterogeneous clinical population, including multiproblem and subclinical clients. Studies are often conducted in less controlled settings than those typically used in other group designs (e.g., outpatient clinics). The analysis may also be expanded to include issues of training and imple-

mentation of treatment by clinicians in these settings. Relevant outcomes may include factors such as acceptability of the intervention by clients and clinicians as well as cost effectiveness.

An interest in factors that affect the application of an intervention in actual applied settings is driven by the pragmatic truth criterion on which CBS is based. If truth is determined with respect to meeting the analytic goals of prediction and influence of behavior, then determining the ability of a theoretical analysis and subsequent intervention to affect behavior in the contexts in which it would actually be applied is essential. Effectiveness trials can test the utility of both the theoretical model and treatment in influencing behavior at a high degree of complexity and abstraction. These studies help to identify additional factors related to the impact of an intervention. The boundary conditions of the model are tested with findings that lead researchers to adjust the theory or technologies to better match the needs of clinicians and their clients. Large-scale effectiveness studies have demonstrated the effectiveness of ACT in outpatient settings that target heterogeneous clinical populations (e.g., Forman, Herbert, Moitra, Yeomans, & Geller, 2007; Lappalainen et al., 2007; Strosahl, Hayes, Bergan, & Romano, 1998).

Training and dissemination. This methodological approach to model testing can be further expanded to examine variables related to application, dissemination, and training. But it cannot be taken for granted that the existence of effective intervention models and techniques will lead to their acquisition and implementation by practitioners. There is an extensive literature indicating the boundaries of such arguments (e.g., Goisman, Warshaw, & Keller, 1999). Together with the institutional barriers and other sociological factors that tend to maintain ineffective clinical prac-

tices, practitioners also experience the same historical and situational contexts that lead to psychological inflexibility in their recipients. If this is correct, then one would expect processes targeted in treatment also to potentially apply to the training and application of the treatment. Thus, CBS treatment approaches such as ACT involve the application of the model to the therapist as well as the client. Some data support this application, with studies finding that ACT workshops for therapists can reduce burnout (e.g., Hayes, Bissett, et al., 2004) and can increase the adoption of empirically supported treatments by clinicians (e.g., Varra, Hayes, Roget, & Fisher, 2008).

Summary. The rejection of the full range of methodological approaches has needlessly narrowed the focus and impact of behavior analysis. The traditional behavioral arguments against these methods do not apply to their use in a CBS approach. We are not, for example, arguing that group studies provide an adequate basis for the identification of behavioral principles and theories. But tests of behavioral approaches need to be properly scaled. If the claim is that language processes lead to general patterns of experiential avoidance, those general patterns need to be examined in a relevant population. If middle-level terms are identified and measured that are argued to account for outcomes in a wide range of people with particular problems, then that mediational claim must be tested with methodologies appropriate to the test.

Scope of Application

Another characteristic of the testing of processes and outcomes in a CBS approach is to test assessment and intervention methods using a variety of modes of delivery (individual psychotherapy, group-based formats, brief workshops, bibliotherapy, Internet-based interventions) and a wide range of targets that fit the underlying analysis. This breadth of testing is not just practical in the sense of carrying forward the profits of science into areas of human concern; it provides the biggest challenge of theoretically specified processes of change and the interventions linked to them. Thus, it is not by accident that this wing of behavior analysis has, despite its applied roots, never wavered from its goal of an experimental analysis of language and cognition. For example, ACT has recently been tested in nonclinical areas in which language may create barriers to effective action including prejudice or stigma (e.g., Lillis & Hayes, 2007; Luoma et al., 2007) and work-site functioning (e.g., Bond & Bunce, 2000). In addition, if the RFT analysis of language is correct, it can be expanded to a number of areas beyond psychological problems. Recent studies have begun to do so with application in areas such as education (Berens & Hayes, 2007). This expansion involves a willingness to confront the full range of behaviors and problems that may be related to language and cognition.

Dissemination, Community, and Cultural Impact

As mentioned at the beginning of the paper, scientists should be accountable for perpetuating and disseminating their own work. The pragmatic focus of CBS has been combined with several steps to ensure an open, nonhierarchical community. There is no attempt to restrict training or to link it to proprietary interests. List serves are open. A tradition of providing clinical and research resources at low cost or no cost was created. Nonbehaviorists and critics were actively sought out, and their ideas were given free expression in CBS conferences, although CBS remains committed to a behavior-analytic account.

There is indication of cultural impact of this approach not only among professionals but also in other disciplines and the popular media. For example, by the end of 2009 over 35 original books on ACT and RFT will have been published worldwide. Not counting translations from English, original books now are published or in press in Japanese, Finnish, Italian, Spanish, French, German, and Swedish. Government grants on ACT and RFT are approaching $20 million worldwide. The ACT-RFT research program has been the subject of considerable national publicity and attention outside behavior analysis, in the popular press (e.g., Cloud, 2006) and professional publications (e.g., Arch & Craske, in press; Hofmann & Asmundson, 2008). ACBS has nearly 2,000 dues-paying members. There are over a dozen organized ACT and RFT interest groups and list serves outside the United States, totaling several thousand members.

This attention is bringing nonbehaviorists into contact with behavioral thinking, which is an explicit part of its purpose. For example, there is extensive discussion of basic behavior analysis by nonbehaviorists on CBS list serves (e.g., see Chantry, 2007); as a result of practitioner demand, publishers who commonly publish ACT materials are now publishing books on behavioral principles for clinicians (e.g., Ramnerö & Törneke, 2008) or on how to apply the literature on derived relational responding (Rehfeldt & Barnes-Holmes, in press); nonbehavioral clinicians at ACBS conventions demand sessions on basic behavioral principles.

RECAPTURING THE CENTER OF PSYCHOLOGY

With an evolution of traditional behavior-analytic thinking, based firmly in contextualistic thinking, there is not a topic in psychology that behavior analysis cannot begin to address practically, theoretically, and empirically, and without minimization of complexity. This is what is needed to return behavior analysis closer to its original grand vision. For behavior analysis to address the mainstream issues faced in behavioral science and ensure its success, mere interpretation is not an acceptable end point, behavioral jargon in all settings is not functional, methodological rigidity is not justifiable, continued insistence on animal learning as the best or even only foundation for basic behavioral science and behavioral principles is self-defeating, and penetration into the culture at large needs to be actively sought, monitored, and evaluated. Rather than arguing these points in the abstract, we have tried to show that from the roots of clinical behavior analysis has grown an alternative approach—contextual behavioral science—that is an extension of behavior-analytic strategic thinking but is still entirely philosophically consistent with it, and that is yielding concrete signs of success, growth, and penetration into the mainstream. We argue that the basic steps in a CBS approach are not limited to ACT. Applied technologies are beginning to emerge from RFT that have nothing to do with ACT (Rehfeldt & Barnes-Holmes, in press). These applications could be linked to models with clinically accessible middle-level functional terms, and to diverse methodological tests. The same should be possible with any behavior-analytic method, given the commitment to do so.

Behavior analysis was at one time one of the boldest areas in all of behavioral science. It is odd that it is more marked in the present day by its methodological conservatism. The CBS approach maintains a firm commitment to the key methods of observation and analysis that have proven useful in behavior analysis, but opens the door to greater conceptual and methodological diversity based firmly on those foundations.

The core of this approach is philosophical clarity and a unified strategic vision linked to these assumptions. Contrary to others (e.g., Epstein, 1991; Marr, 1997), we argue that *isms* in behavioral science are not the enemy. For decades, one *ism* that worked very well indeed was the one attached to the word *behavior*. In our view, behaviorism can be made more relevant to the modern era when approached from the point of view of contextualism and when linked to a refinement of traditional behavior-analytic goals: the prediction and influence, with precision, scope, and depth, of the actions of whole organisms interacting in and with an environment considered historically and situationally.

Behavior analysis, from its roots in animal learning to the stars of Walden Two, reached toward a comprehensive conceptual and experimental analysis that would be adequate to the challenges of the human condition. Somehow that vision faded to a degree as the field retreated to a smaller subset of areas in which it was succeeding spectacularly well. These self-inflicted limits need to be cast aside. Behavior analysis belongs at the center of modern psychology, pursuing its original vision of a comprehensive account of behavior.

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